ABSTRACT

METHOD AND APPARATUS FOR A VARIABLE BANDWIDTH MULTI-PROTOCOL X-DSL TRANSCEIVER

~~An apparatus and method is disclosed for a variable bandwidth X-DSL modem. The modem implements a discrete multi-tone (DMT) line code with varying tone spacing depending on the bandwidth availability on selected subscriber lines. For short subscriber loops that qualify for high data rates the spacing between tones in a tone set is expanded to support the higher data rates. A DFT/IDFT engine is implemented in the DSP with a DFT portion to convert digitized tone sets on a receive path for each channel to digitized symbols and an IDFT portion to convert the digitized symbols on the transmit path to digitized tone sets. The DFT/IDFT engine provides variable tone spacing for the at least one channel. A variable rate interpolator couples to the IDFT portion of the DFT/IDFT engine and sets the sampling rate at the output of the IDFT to match the sampling rate of a digital input to the digital-to-analog (DAC) portion of the analog front end (AFE). A variable rate decimator provides corresponding capability on the receive path. A scheduler couples to the DFT/IDFT engine for scheduling channels to be processed by the DFT/IDFT engine during each processing interval. An initialization procedure is used to determine appropriate tone spacing to be used for the channel based on the loop qualifications of the channel.~~ A transceiver for communicating a multi-tone modulated communication channel on a subscriber line. The transceiver includes: a digital signal processor (DSP) with a Fourier transform module and an analog front end (AFE). The DSP determines an available range of frequencies on the subscriber line and expands or contracts the tone spacing of each of a fixed number "N" of tones accordingly by decreasing or increasing the processing interval associated with the Fourier transform of each tone set. The AFE performs digital-to-analog conversion of the multi-tone modulated communication channel at rates compatible with the processing interval of the Fourier transform module; whereby the range of frequencies spanned by the modulated tones on the subscriber line conforms to the available of frequencies on the subscriber line.